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ABSTRACT

In an effort to meet the diverse interests of the students and to move away from a rigidly structured curriculum, the Civil Engineering Department at the City College of New York has offered the civil engineering student an elective program that incorporates engineering and science electives as well as liberal arts electives. It was readily apparent that students could not be left to their own devices without being seriously impaired by taking unsatisfactory packages of electives. A pilot program was established by the Civil Engineering Department, with the assistance of the Office of Curriculum Guidance, to establish faculty mentors for all civil engineering students from upper freshmen to upper seniors. A primary objective of this program was to help improve the retention of engineering students. Faculty members were charged with the task of aiding the students in the task of selecting a program for successive terms which would lead to the successful completion of a Bachelor of Engineering program. He explains to the student the procedure for electing liberal arts electives, the restraints on the scope of the student's alternatives and the selection of the alternative civil engineering elective packages. At present, the other departments in the School of Engineering are implementing similar faculty monitoring systems. (LS)

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FACULTY MENTORING OF UNDERGRADUATES AT CITY COLLEGE

by

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Faculty Mentoring of Undergraduates
at City College

Defining the Problem

In an effort to meet the diverse interests of the students and to move away from a rigidly structured curriculum, the Civil Engineering Department at the City College has offered the Civil Engineering student an elective program that incorporates Engineering and Science electives as well as Liberal Arts electives. The flow chart shown in Figure one illustrates the idealized progress of a student from freshman to senior. This loosening of the structured curriculum combined with the adoption of an open enrollment program at the City University has generated a number of interesting problems which did not exist under the old system.

Among these are:

1) What Liberal Arts courses may a student elect and still fulfill the objectives of a well-rounded education;

2) What may a student elect as Engineering electives;

3) How may a student put together a package of Engineering electives that will satisfy the Department and also permit him to graduate without excessive delay?

It was readily apparent that students, who formerly adhered to a rigid structured curriculum which specified exactly what courses they must take, were somewhat at sea under the new curriculum and could not be left to their own devices without

being seriously impaired by taking unsatisfactory packages of electives, and, also, undermining confidence in the faculty and Department which offered the curriculum. A pilot program, therefore, was established by the Civil Engineering Department, with the assistance and cooperation of the Office of Curricular Guidance, to establish faculty mentors for all Civil Engineering students from upper freshmen to upper seniors. A primary objective of this program was to help improve the retention of Engineering students. "Creating a feeling of belonging and of fellowship with other engineering students and faculty can reinforce the freshman's commitment to engineering and show him he is not alone on the long march toward becoming an engineer"(1), aptly summarizes this objective, which for reasons to be shown is by no means restricted to freshmen alone. The use of faculty mentors enhances the four point program of goals outlined in Morgan (1).

1) Students would be given a good idea of what engineering is by face-to-face discussion with their mentors, all of whom would be drawn from practicing engineers; this job could not be assigned to graduate students.

2) A high level of academic performance would be encouraged by all faculty mentors in their discussions with the undergraduates.

3) Academic work in the institute would strengthen

weaknesses since the faculty mentor could guide the student in remedial course work, if any, and guide students away from heavy workloads engendered by poor program planning and unwise liberties taken with regard to prerequisite course work.

4) Students would be made to feel important by the knowledge that a "self-paced method" of program planning was being carried out for them as individuals. As Flammer and Mecham (2) have pointed out this setting of a good self-image, well defined self goals including greater self-involvement and responsibility, and good curricular planning management would be strong motivating forces for the student and the faculty.

Faculty mentors were charged with the task of aiding the students in the task of selecting a program for successive terms which would lead to the successful completion of a Bachelor of Engineering program. The task involved selecting and scheduling a total of 145 credits, (See Figure 1) including 41 pre-engineering basic science credits, 50 Engineering major credits (principally Civil Engineering), 30 Liberal Arts elective credits and 24 Engineering elective credits (the majority of which are required to be Civil Engineering). Assistance was provided during the course of the semester and at registration.

Conditions at The City College

The City College registration and curricular planning procedures are not rigidly structured. The primary governing criteria for selecting and scheduling any particular course are:

1) Whether the course is accepted for credits toward the Bachelor's Degree in Civil Engineering;

2) Whether the student has the prerequisites for such a course;

3) Whether space is available for the student in that course.

City College students come from diverse backgrounds with varying degrees of preparation. Institution of an open enrollment program has exacerbated the high degree of variety in student backgrounds. Students enter the School of Engineering directly or from a two year pre-engineering program in sister colleges of the CUNY system as they have in the past. A new influx of transfer students is appearing from the two year Community Colleges which form the main vehicle of the open enrollment program.

As Figure 2 shows, the percentage of students in the total Civil Engineering class who have completed specified credit totals varies markedly. Peaks appear in three general areas:

1) At the freshman level, indicating not only a substantial attrition rate, but also the effect of non-credit bearing remedial courses which cause the under-prepared student to remain at the freshmen level for longer periods than the adequately prepared student. Such remediation programs have been demonstrated in "A Program for High Risk Freshmen" (3) to be necessary and workable to insure that high academic standards are maintained.

2) At the middle level, indicating the relatively large new input into the engineering school created by community colleges (two year schools) and by transfers from other institutions which reflects the importance of two year schools and the effects of the greater mobility in both the national and international society. These changes were clearly forcasted by Dickason (4) and it is incumbent upon engineering schools to adjust themselves to this pattern since the traditional four year program will not provide enough students during the middle period because of the combined effects of attrition and remediation of under-prepared students.

3) At the senior level, indicating the variability of terminating a 145 credit program at the end of four, four and a half or five years. This results from tailoring the individual student's program to his own specific needs. It also

indicates a build up of students who have completed a major part of their course work and who have elected to work, completing their degree requirements on a part-time basis.

A flexible registration procedure which offers a myriad of program alternatives results in each student being offered a relatively flexible set of alternative programs each and every time he registers. A surfeit of such alternatives can lead the unwary student into many traps:

1) He may select courses for which he has not completed the prerequisites;

2) He may select a combination of courses which seriously overburdens him in terms of laboratory work, recitations and term projects;

3) He may select a package of electives which is not satisfactory to the Department and the School of Engineering.

The faculty mentor's task is to counsel the student with regard to these problems and assist him in preparing election cards which serve as a form of pre-registration with respect to courses offered by the Civil Engineering Department.

The Faculty Mentor Solution.

The operation of the departmental system begins by counseling students after initial preparation by the Office of Curricular Guidance. (This latter office interprets

entrance examination data, evaluates transfer student credits, and sets up programs, including any required remediation for entering Engineering freshmen.) City College is a commuter school where students arrive on campus in time for classes and depart when they are completed. Few live close to the college and the traditions of a live-in campus are non-existent. When a student reaches the upper freshmen class he is assigned to a faculty mentor by a notice mailed to his home indicating from whom he should seek guidance for the remainder of his undergraduate career. Every effort is made to keep an individual student with a particular mentor throughout his time at the school, but exceptions may be made for faculty sabbaticals, retirements or other unusual circumstances.

The faculty mentor first meets the student in an advisory capacity very early in the term in order to plan his program for the succeeding terms. The faculty mentor explains to the student the procedure for electing Liberal Arts electives and the restraints on the scope of the student's alternatives. At as early a time as is mutually agreeable the student is advised of the alternative Civil Engineering elective packages that he may select. (At present packages are offered in Urban Engineering, Transportation, Water Resources, Structures, Engineering Mechanics, Engineering Geology, Oceanographic Engineering and a general

elective package in Civil Engineering which, in effect, represents what the faculty considers to be the broad-based package formerly incorporated as the structured curriculum). It should be noted that there is no prohibition on special packages tailored to fit the needs of individual students.

The faculty mentor pays close attention to the pre-requisites for courses and to the student's relative ability to carry a given work load (i.e., superior students may take larger than normal work loads, students who work part-time may take near minimum work loads.) The faculty mentor must be aware of the tentative scheduling of Engineering electives so that student's program objectives can be met. Frequently, students are not completely sure of their career objectives. These students may obtain detailed descriptions of the various fields from their mentors; they may also be advised to consider the general elective package as their objective.

Auxiliary Concerns

Byproducts of faculty mentoring include better advising of marginal students, estimating elective course demand and preregistering of students into available classes. The first involves a sensitive human relations problem which can not be treated lightly.

Elton and Rose (5) have shown that students who leave engineering are by no means limited to academically

marginal students but also include intellectually able students who may be "turned off" by some aspects of engineering. These intellectually able students may be the very students who can provide creative and sensitive solutions to the technology interface problems that characterize environmental impact statements. Thus the marginal student can be either one who is in academic difficulties or one who is having difficulty identifying with engineering.

Marginal students must be given programs in which they have the highest chance of eventual success. The faculty mentor must attempt to encourage the student to work harder, build up the student's morale and yet, insure that the student does not overreach himself. This process requires frequent counseling until either the student's academic performance stabilizes at a satisfactory level or until the student drops out (or is dropped). In this area, it is important for the student to understand that the faculty is trying to assist him, in order not to discourage students by combining the image of an insensitive faculty with an admittedly difficult course of study.

Estimation of elective course demand is greatly facilitated by judicious faculty mentoring. Tables of projected elective offerings and subsequent modifications are prepared using data obtained through the faculty mentors. Here twin evils must be equally avoided. Student

interest in a particular elective course may be relatively small. If the elective course is offered every term and insufficient students register, budgetary restrictions compel the registrar to cancel the course. This is seriously counterproductive since interested students will be dissuaded from choosing that elective and the course offering will eventually disappear. Equally unfortunate is the availability of sufficient space in popular elective courses, since students who are denied admission to such courses at registration time will become dissatisfied with the faculty and frequently with their careers.

Greenfield (6) has shown the importance of the Engineering Student's views of guidance and counseling in reinforcing or breaking his morale. If the student sees the department expending the extra effort required to make a faculty mentoring and pre-registration system work the student will be responsive to this by recognizing that success will depend on the extra effort that the student expends on course work.

Student dissatisfaction and degradation of the elective program may be avoided by planning ahead, by scheduling some electives only as frequently as the demand indicates and scheduling additional sections when an overly large demand is indicated. The best indicator of demand is contained in the meetings between students and faculty mentors.

At The City College courses have been added or dropped on the basis of this information with satisfaction reported by both the students and the faculty.

Pre-registration of students helps ease the frustrations and problems of students who are seriously interested in obtaining the maximum benefit from their engineering education. At The City College each department is responsible for scheduling its own courses. In planning the schedule of courses, closed courses and conflicting schedules are minimized by running student requests through a computer utilizing programs developed in this department to determine schedule conflicts and course demand, and modifying the number of sections offered and the scheduled hours of the classes accordingly. With a pre-registered student, obtaining course cards for Civil Engineering courses is reduced to a matter of routine. The process has been summarized by the flowchart shown in Figure 3. This chart shows the development of program planning through the course of one term, culminating in the process of registration for the succeeding term.

Students have expressed great satisfaction with the system instituted by the Department, and they have learned that cooperation is highly beneficial to both themselves and to the Department of Civil Engineering. Even though the system is voluntary and no penalties are imposed,

internal studies have shown that at registration time pre-registrants have had a 75% retention rate, which is a substantial measure of the effectiveness of the system.

Extension of the Program

At present, the other departments in the School of Engineering are implementing similar faculty mentoring systems because all departments offer diverse sets of electives within their own disciplines and similar Liberal Arts elective programs. The impetus for such change has been in some measure due to the demonstrable success achieved by the Civil Engineering Department with the system outlined above. Such a system lends itself to computer aids, while not leaving the school open to charges of dehumanization and criticism about turning students into faceless numbers; such criticisms are frequently lodged against many computerized registration and pre-registration procedures in colleges today.

The current needs of the Engineering profession are such that Engineering schools cannot afford to alienate potential Engineering graduates. With the inflationary trends in the economy and the end of the Selective Service draft, college enrollments are dropping at an alarming rate. The dropout rate is particularly acute in Engineering schools. Faculty mentoring can help make Engineering more attractive by offering the student truly professional counseling given by Engineers who are thoroughly familiar with their profession

and able to project their experience for the benefit of their students.

By means of faculty mentoring it is hoped that the students will achieve a firmer idea of what professional opportunities exist and where they would reap the greatest professional satisfactions in the course of their career. The Engineering profession can only gain from forging a stronger, closer relationship between students and faculty.

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4. Dickason, D. G., "The Dynamics of Engineering Enrollment", Engineering Education, January 1972, pps. 394-401

5. Elton, C. F., and Rose, H. A., "Students Who Leave Engineering", Engineering Education, September-October 1971, pps. 30-32.

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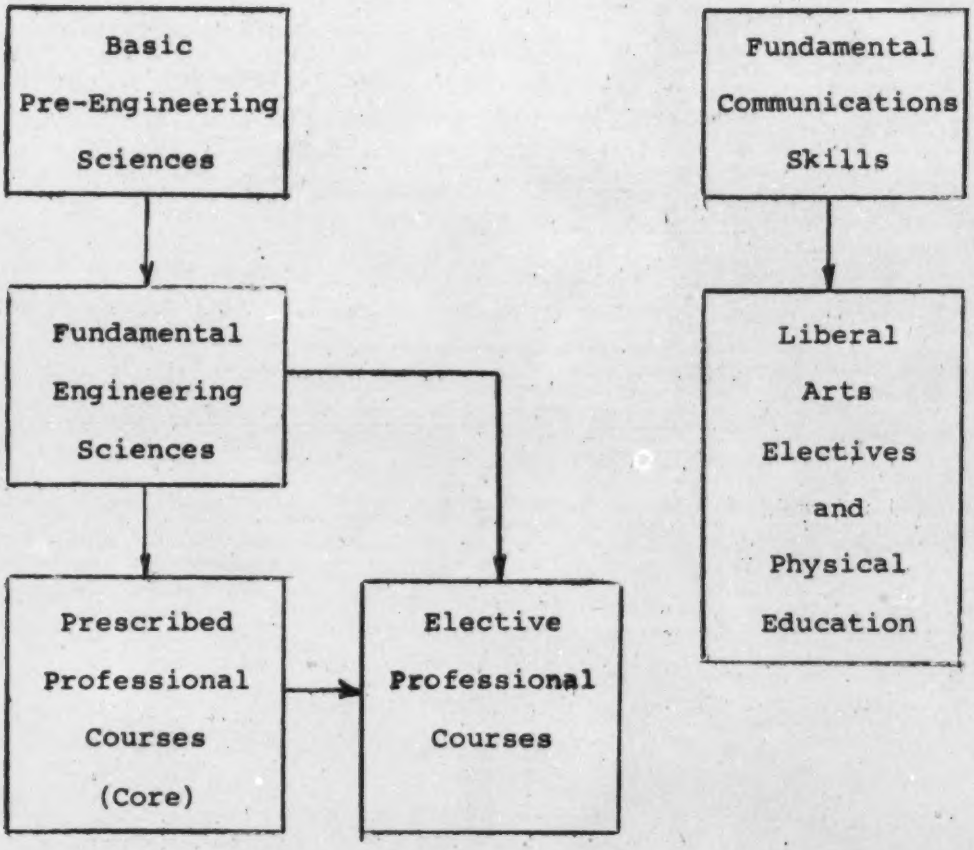
Figure 1

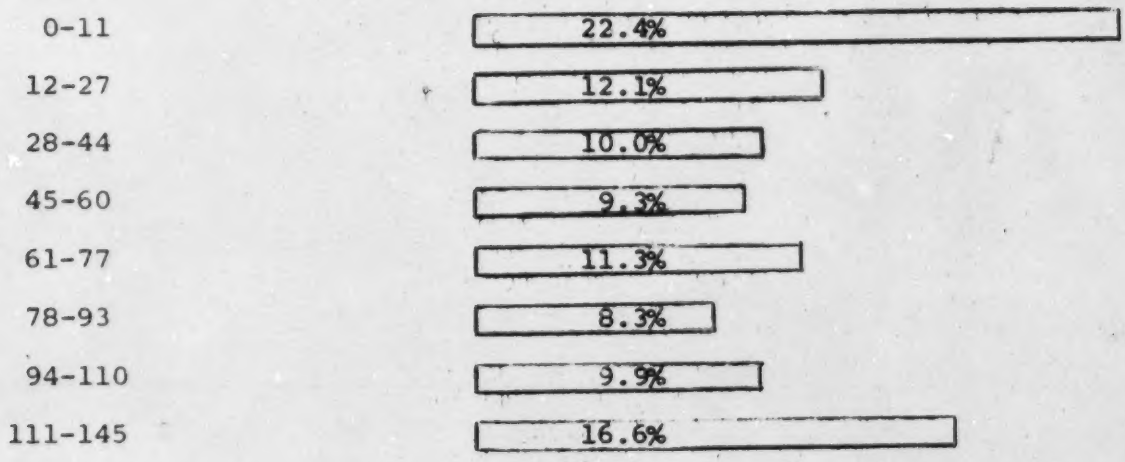
Civil Engineering Curriculum Flow Chart



Source: School of Engineering Bulletin, City College of New York

Figure 2

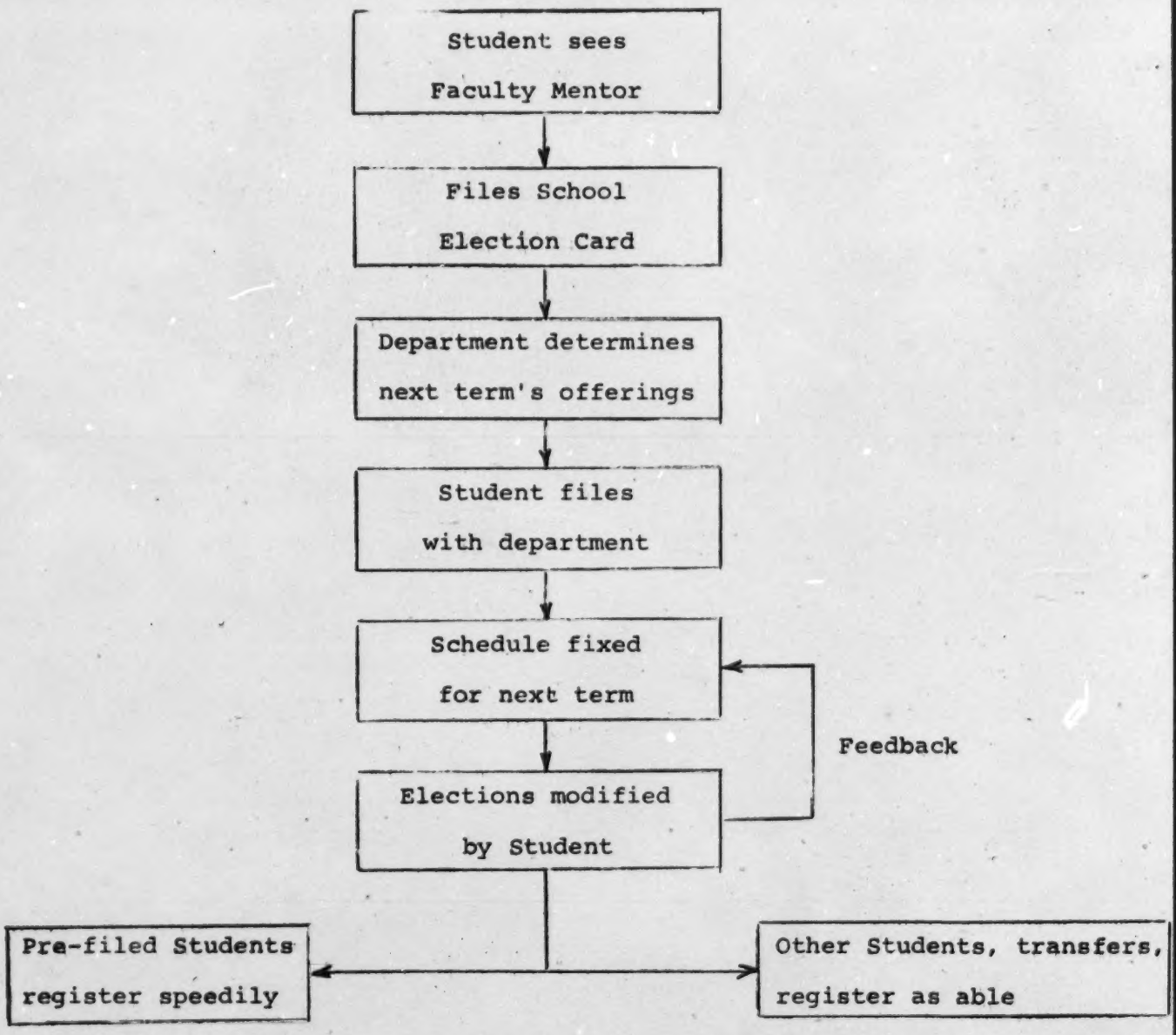
Distribution of Civil Engineering Students by Credits Completed



Source: Unpublished data on student enrollments, C. E. Department

Figure 3

Faculty Mentoring Process for One Term


Student sees Faculty Mentor
Files School Election Card
Department determines next term's offerings
Student files with department
Schedule fixed for next term
Elections modified by Student
Feedback
Pre-filed Students register speedily
Other Students, transfers, register as able